

# Short Communications

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## Sex-related Differences in Migration Chronology and Winter Habitat Use of Common Snipe

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**ABSTRACT.**—There is little information concerning differences in migration chronology between male and female Common Snipe (*Gallinago gallinago*) and virtually no accounts of sex-related differences in winter habitat use. We collected 372 Common Snipe in five different habitat types during the non-breeding period along the central Gulf Coast of Texas. Proportions of male and female snipe collected on wintering areas during the beginning of the fall period (i.e., between 6 and 21 October) indicated a tendency for females to arrive ahead of males. Sex ratios during the latter part of spring (16 March–10 April 1998) suggested male snipe leave wintering areas before females. During the winter period (14 November 1997–4 February 1998), female snipe were more common than males along the Texas Gulf Coast. Differences in sex ratios during winter are likely due to sex-related differences in habitat use. During winter, females were more common than males in heavily vegetated habitats (e.g., coastal marshes and cultivated rice fields). Conversely, males were more common in open habitats (e.g., mud flats). Male snipe may begin spring migration before females to establish territories on the breeding grounds. Sex-specific differences in winter habitat use may be related to reverse sexual size dimorphism of Common Snipe. Received 16 April 1999, accepted 23 Sept. 1999.

Among most shorebird species (Charadriiformes), males begin spring migration before females, and females begin fall migration before males (Oring and Lank 1982, 1986; Morrison 1984). These patterns may be reversed depending on the breeding system, type of parental care, molting schedule, or distance to wintering areas for each sex (Oring and Lank

1982, 1986; Pienkowski and Evans 1984). American Woodcock (*Scolopax minor*) do not exhibit sex-related differences in timing of fall migration, but males compete for the best breeding territories and begin spring migration before females (Sepik and Derleth 1993a). In contrast, Spotted Sandpipers (*Actitis macularia*) exhibit resource defense polyandry and females arrive on breeding grounds earlier than males (Oring and Lank 1982, 1986). Previous studies of Common Snipe (*Gallinago gallinago*) have reported dates of migration from breeding and wintering areas (Arnold and Jirovec 1978, Johnson and Ryder 1977, McKibben and Hofmann 1985), but few have reported sex-related differences in arrival and departure times. Whitehead (1965) and Tuck (1972) suggested that male snipe began spring migration before females. However, Whitehead (1965) concluded that males also began fall migration before females, contrary to Tuck's (1972) conclusion.

Although many shorebird species exhibit sex-related differences in habitat use (Puttick 1984), there are no published accounts of such differences for Common Snipe. However, White and Harris (1966) analyzed differences in diets of wintering snipe collected from five different habitats in northern California and concluded there were behavioral differences associated with habitat use among snipe (i.e., they used salt marsh habitat mostly for loafing and upland pastures as feeding sites). In addition, male American Woodcock use forest openings more than females do during summer, fall, and winter (Horton and Causey 1979, Sepik and Derleth 1993b). Because woodcock and snipe are closely related and have similar foraging strategies, we hypothesized that male snipe may use less vegetated habitats than females during the non-breeding period.

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We investigated migration chronology of male and female snipe by comparing sex ratios of snipe collected on wintering areas along the central Gulf Coast of Texas during fall and spring. In addition, we report differences in proportions of males and females collected in five habitat types during the winter period. This study was conducted as part of a larger project to determine methods for externally aging and sexing Common Snipe and to investigate their nutritional ecology (i.e., diet, body composition, and gut morphology) throughout the non-breeding period.

### STUDY AREA AND METHODS

We conducted this study in the rice prairies and coastal marshes of Brazoria, Calhoun, Colorado, and Wharton Counties of Texas from October 1997 through April 1998. Collection sites included private farmland, several wildlife management areas (WMA) managed by Texas Parks and Wildlife Department, and Brazoria National Wildlife Refuge (NWR). Collection sites were comprised of five different habitat types including harvested rice fields, mud flats, fallow rice fields, drained impoundments, and coastal marshes. Vegetation in harvested rice fields contained mostly rice (*Oryza sativa*) and ryegrass (*Lolium* spp.) knocked down by Lesser Snow Geese (*Chen caerulescens*) and White-fronted Geese (*Anser albifrons*). Mud flats were recently plowed rice fields that contained no standing vegetation. Fallow rice fields had not been cultivated for three years and contained mostly smartweed (*Polygonum* spp.), false indigo (*Amorpha fruticosa*), and rattlebox (*Sesbania drummondii*). Drained impoundments had not been cultivated for rice production for two years and contained mostly smartweed, rattlebox, broadleaf signal grass (*Brachiaria platyphylla*), false indigo, nutsedge (*Cyperus* spp.), and millet (*Echinochloa* spp.). Coastal marshes had been moderately grazed by cattle and burned in September 1997; dominant vegetation included spike rush (*Eleocharis* spp.), Gulf cordgrass (*Spartina spartinae*), salt grass (*Distichlis spicata*), and marsh-hay cordgrass (*Spartina patens*). With exception of Brazoria NWR, all sites were hunted intensively for waterfowl, but snipe hunting was rare.

We collected snipe by shooting and systematically alternated between habitat types throughout the non-breeding period. To maintain equal sampling effort, we typically collected four birds per day throughout the diurnal period. All specimens were sexed by gonadal examination and we recorded the habitat type from which each bird flushed. We separated the non-breeding period into three seasons, using the period of pre-basic molt to define fall (6 October–13 November 1997), the non-molting period to define winter (14 November 1997–4 February 1998), and pre-alternate molt to define spring (5 February–10 April 1998). These dates are based on physiological events rather than arbitrary calendar dates. We feel they provide a better

source of interpretation for detecting physiological (i.e., body composition and gut morphology) and dietary changes in Common Snipe. We used a standard Z-test (SAS version 6.12 for Windows; SAS Institute, Inc. 1988) testing the null hypothesis that proportions of male and female snipe during each seasonal period and within each habitat type during winter were equal to 50%.

### RESULTS

Between 6 October 1997 and 19 April 1998, we collected 372 Common Snipe (152 males and 220 females). Females ( $n = 25$ ) were more common than males ( $n = 15$ ) during the first 26 days of the fall period, with sex ratios becoming approximately even (14 females, 15 males) during the last 13 days (Fig. 1). Between 6 and 21 October there appears to be a trend of more females ( $n = 15$ ) than males ( $n = 7$ ;  $Z = 1.70$ , 1 df,  $P = 0.088$ ). However, proportions of male and female snipe did not depart significantly from an even sex ratio during fall ( $Z = 1.58$ , 1 df,  $P > 0.05$ ). Sex ratios (45 females, 41 males) during the first 39 days of the spring period were essentially even (Fig. 2). Between 16 March and 10 April, females ( $n = 41$ ) were more common than males ( $n = 17$ ) and proportions departed significantly from a 50:50 sex ratio ( $Z = 3.15$ , 1 df,  $P = 0.002$ ). Most snipe had left wintering areas along the central Gulf Coast of Texas by 10 April, and none was observed after 19 April, despite daily surveys.

During the winter period, the overall proportion of males ( $n = 64$ ) to females ( $n = 95$ ) departed significantly from an even sex ratio ( $Z = 2.46$ , 1 df,  $P = 0.014$ ). We excluded 12 males and 17 females from the habitat use analysis because we were unable to determine the habitat type from which they flushed. Sex ratios were skewed toward females in rice fields and coastal marshes, while mud flats contained a higher proportion of males (Table 1). Proportions of male and female snipe were similar in fallow rice fields and drained impoundments (Table 1).

### DISCUSSION

We observed few snipe from 6–14 October 1997, but the number of birds gradually increased into November indicating that most snipe arrived on wintering areas along the central Gulf Coast of Texas after mid-October. Arnold and Jirovec (1978) reported that the

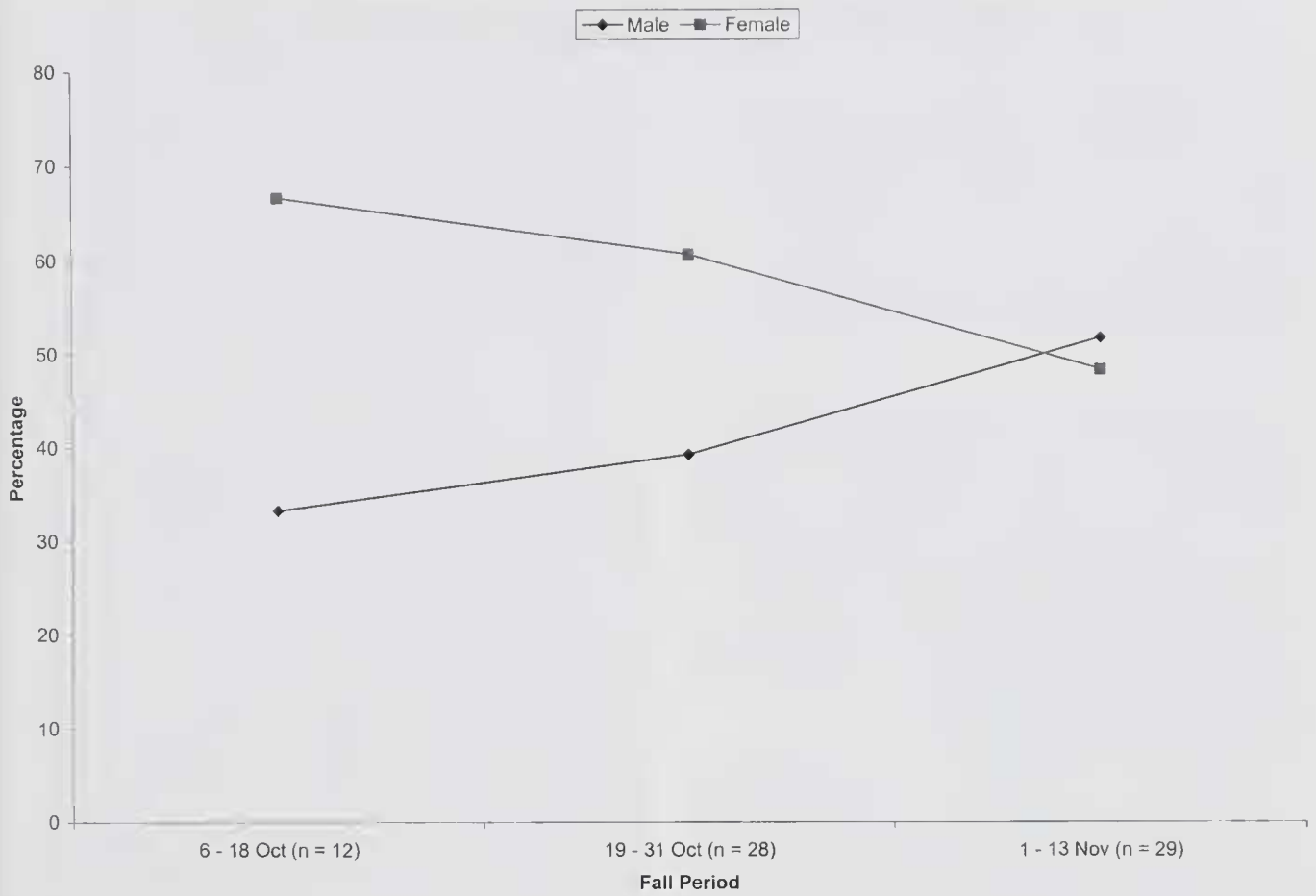


FIG. 1. Proportion of male and female Common Snipe (*Gallinago gallinago*) on wintering areas along the central Gulf Coast of Texas during fall.

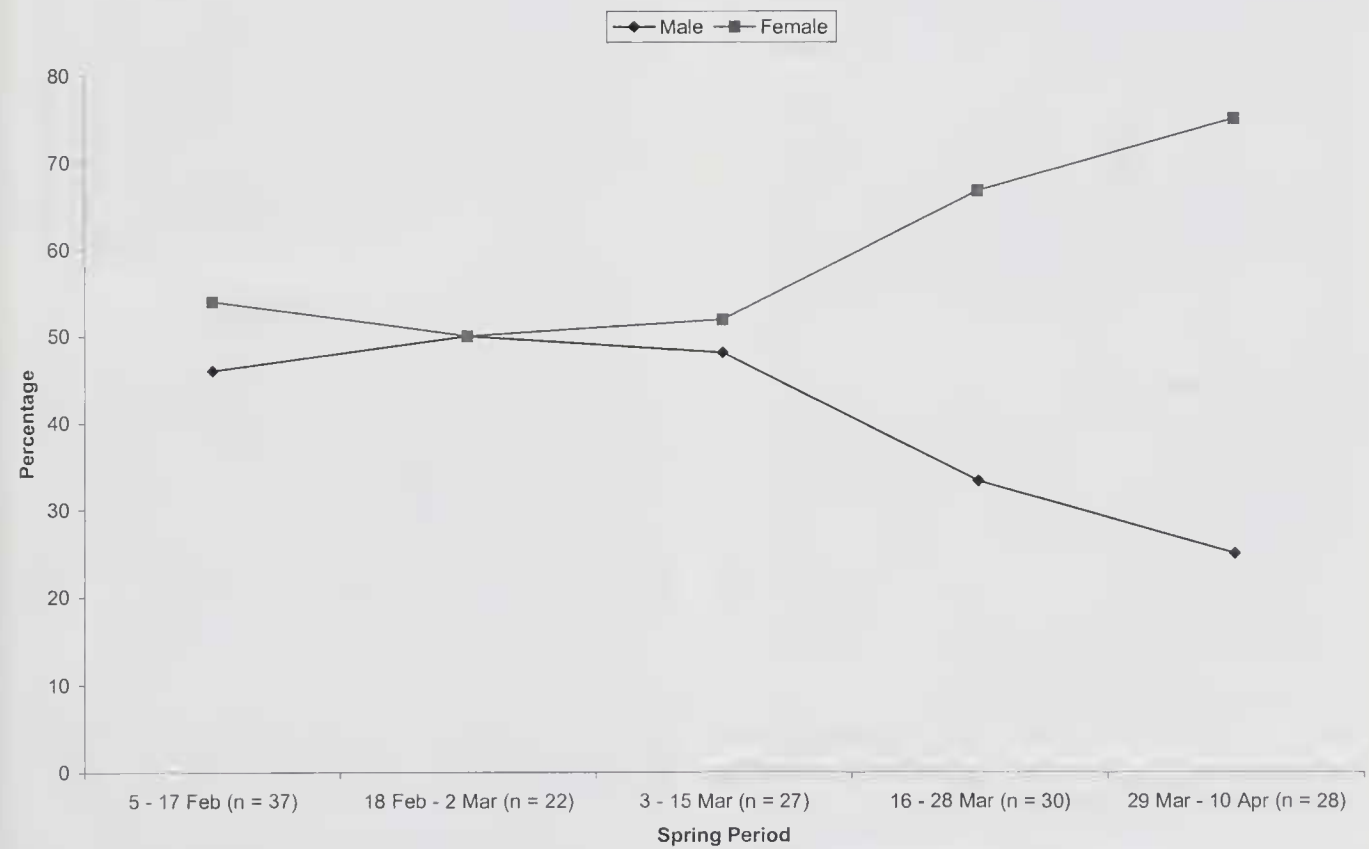


FIG. 2. Proportion of male and female Common Snipe (*Gallinago gallinago*) on wintering areas along the central Gulf Coast of Texas during spring.



TABLE 1. Percent (*n*) of Common Snipe collected in different habitat types during winter 1997–1998 along the central Gulf Coast of Texas.

Habitat	Male	Female	Z <sup>a</sup>	P
Rice field	31.6 (12)	68.4 (26)	2.27	0.023
Mud flat	82.6 (19)	17.4 (4)	-3.13	0.002
Fallow rice field	38.5 (5)	61.5 (8)	0.83	>0.05
Coastal marsh	23.7 (9)	76.3 (29)	3.24	0.001
Drained impoundment	38.9 (7)	61.1 (11)	0.94	>0.05

<sup>a</sup> df = 1.

average fall arrival date of Common Snipe on wintering areas in east-central Texas was 5 October. White and Harris (1966) reported similar arrival dates on wintering areas in northwestern California. Studies conducted on breeding areas in Colorado and California indicate that snipe typically depart around mid-September (Johnson and Ryder 1977, McKibben and Hofmann 1985).

During fall there was no significant difference in the overall proportion of male and female Common Snipe. However, females were more common than males earlier in the fall, suggesting that females arrive on wintering areas before males (Fig. 1). It is possible that birds arriving before mid-October are failed breeders (i.e., both male and female) that are followed by females that have successfully reproduced. This would be consistent with most shorebird species where fall migration sequence is generally: failed breeders → adult females → adult males → juveniles (Oring and Lank 1982, Morrison 1984). Shorebird species that migrate long distances generally exhibit a tendency toward promiscuous breeding systems and one sex (usually the female) departs prior to the sex taking on most or all brood rearing responsibilities (Morrison 1984). Although evidence is lacking, snipe are probably monogamous with females performing incubation and males sharing equally in brood rearing responsibilities (Tuck 1972). However, suspected equality in parental duties among monogamous shorebird species often proves unequal, with males actually assuming most of the brood rearing responsibility (Miller 1985). Desertion by the female may reduce competition for food between the remaining parent and young, while increasing her chance of survival by allowing her to reach staging and wintering areas before prey availability is reduced (Jonsson and Alerstam 1990).

Sex ratios were essentially even from 1–13 November (Fig. 1) and from 5 February to 15 March (Fig. 2), but during winter female snipe were more common than males. It is possible that male snipe winter farther south than females due to their smaller body size (Nichols and Haramis 1980, Arnold 1991). However, our data (Fig. 2) suggest that male Common Snipe (like male American Woodcock) begin spring migration before females, probably to establish breeding territories. Spring migration, intrasexual competition for territories, and courtship displays are stressful activities for male woodcock (and probably snipe as well) and often occur when snow and ice reduce food availability (Owens and Krohn 1973). Because male snipe must reach northern breeding area before females, it does not appear energetically advantageous for males to winter farther south than females considering the relatively mild winters along the central Gulf Coast of Texas. Thus, a more likely explanation for skewed sex ratios during winter is that male and female snipe use different habitats.

Our data show male snipe used open areas more than females, while females used vegetated areas more than males. Similarly, the nocturnal behavior of American Woodcock shows males use forest openings considerably more than females on both wintering and breeding areas (Horton and Causey 1979, Sepik and Derleth 1993b). Sex-specific differences in habitat use may be related to reverse sexual size dimorphism exhibited by Common Snipe. Snipe are tactile feeders, probing moist soil for invertebrates and using low vegetation for escape cover (Arnold 1994). The longer bill of the female may facilitate capture of larger, more nutritious prey found deeper in the soil enabling her to accumulate nutrient reserves needed for egg production more ef-

ficiently (Jonsson and Alerstam 1990). On the other hand, if male snipe undertake most parental care, they will likely forage in habitats where their short-billed young can feed efficiently. Thus, they would benefit from a shorter bill themselves while enhancing their parental efficiency (Jonsson and Alerstam 1990). If food is limited, intersexual competition by shorebirds on wintering grounds may be reduced by using different habitats, different size classes of prey, or employing different foraging techniques (Puttick 1978).

In the United States, the largest snipe harvests occur on the wintering grounds of Louisiana, Florida, California, and Texas (Arnold 1994). Although harvests have declined since 1976, poor hunter tracking methods make it difficult to determine if declines are due to fewer snipe hunters, fewer birds, or both (Arnold 1994). Hunter success may be lower in open habitats (i.e., those typically used by males) because snipe tend to flush earlier, out of shotgun range, in these areas compared to more vegetated habitats (J.T.M., pers. obs.). Consequently, wintering female snipe may be more susceptible to harvest than males because of their association with vegetated habitats. Our data suggest that females are more abundant than males, but population managers and ecologists should be aware that obtaining unbiased estimates of true sex ratios for Common Snipe during the non-breeding period might be difficult because of sex-related differences in habitat use.

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## Arboreal Nocturnal Roosting Behavior of a Fledgling American Dipper

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ABSTRACT.—Although the American Dipper (*Cinclus mexicanus*) uses a variety of sites on the ground adjacent to streams for nocturnal roosts, I observed nocturnal roosting in a tree by this species, apparently the first reported case for any dipper species. A fledgling spent at least 8 hours between 20:06 and 04:30 MST sleeping 1.5 m high in a black cottonwood tree (*Populus trichocarpa*), at the tip of a branch overhanging a creek. Use of arboreal roost sites may reduce the probability of predation on fledgling dippers while they are sleeping. Received 1 Aug. 1999, accepted 19 Oct. 1999.

Sites selected by diurnal birds for nocturnal roosting are no less important for survival than sites they choose for nesting (Skutch 1989) because sleeping birds are extremely vulnerable to predators and unfavorable weather. American Dippers (*Cinclus mexicanus*) are known for a life cycle closely associated with fast-moving water and for placing nests in sites that are inaccessible to most predators, such as stream-side cliffs, mid-stream boulders, behind waterfalls, and the undersides of bridges (Bent 1948; Kingery 1996; pers. obs.). Adults often roost overnight during the breeding season in or near their nests under bridges and in rock crevices (Kingery 1996), and once were reported roosting

during winter under a tangle of roots in a steep stream bank (Ehinger 1930). Nest and nocturnal roost sites similar to those of the American Dipper are used by the ecologically similar Eurasian Dipper (*C. cinclus*; Cramp 1988, Tyler and Ormerod 1994). Recently fledged Eurasian Dippers sometimes return to the nest to roost overnight (Cramp 1988).

Survival estimates for fledgling and juvenile American Dippers are less than 35% (Price and Bock 1983); consequently, choice of nocturnal roost sites could be an important component affecting juvenile survival. I have been unable to locate previous reports of dippers of any species roosting overnight in trees or shrubs. However, perching in vegetation, including trees along streams, has been reported occasionally for American and Eurasian dippers (Drew 1881; Merriam 1899; Bakus 1959; Hewson 1967; S. Osborn, pers. comm.), up to 7.6 m above the ground.

I made the following observation of arboreal roosting by a fledgling American Dipper along West Rosebud Creek at Pine Grove Campground (45° 16' N, 109° 39' W; 1798 m elevation) in the Beartooth Mountains of Stillwater County, Montana. At 19:56 MST on 23 June 1999 I heard a fledgling dipper at streamside that vocalized loudly while being fed by an adult. During the next 10 min the fledgling was fed twice as it remained within a 6–8 m stretch of streamside habitat beneath a canopy

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